USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003MN32G

Title: Photochemistry of Antibiotics and Estrogens in Surface Waters: Persistence and Potency

Project Type: Research

Focus Categories: Non Point Pollution, Surface Water, Ecology

Keywords: antibiotics, estrogens, photochemistry, fate, reaction kinetics

Start Date: 9/01/2003

End Date: 08/31/2005

Federal Funds: $134070.00

Matching Funds: $134092.00

Congressional District: Minnesota District 5

Principal Investigators: McNeill, Kristopher (University of Minnesota); Swackhamer, Deborah L. (University of Minnesota)

Abstract: Antibiotics and estrogens are two classes of wastewater contaminants that have been detected in US surface waters. The potentially adverse effects of these pollutants on water quality are unknown, but will be determined, in part, by their persistence. The proposed study will assess the effectiveness of photochemical reactions initiated by sunlight to degrade different classes of antibiotics and estrogens and to modulate their biological activity. Specifically, the goals of this proposal are to determine the importance of photolysis as a loss process for a representative set of antibiotics and estrogens, to assess changes in the antibiotic activity and estrogenicity that occur during photolysis, and to identify the major reaction products and photolysis pathways involved. These goals will be achieved through laboratory kinetic studies, antibiotic activity and estrogenicity assays, as well as product identification through spectroscopic methods, isolation and independent synthesis. The results of this work will provide the scientific basis for informed decisions regarding antibiotic and estrogen pollution and the stewardship of our freshwater resources. The potential recipients of the benefits of this research include state and federal regulatory agencies, utilities responsible for water treatment operations, researchers focusing on treatment processes, and toxicologists interested in potential biological effects of these compounds and their impacts on ecosystems.

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